CONTENTS

CHAPTER 1. OVERVIEW ····1
1.1 OVERVIEW ····1
1.2 WHAT IS GPS ····1
1.3 FEATURES ····1
1.4 CAUTION ····1
CHAPTER 2. COMPONENT ····2
2.1 BASIC COMPONENT ····2
2.2 OPTION ····2
CHAPTER 3. SPECIFICATION ····3
3.1 GPS RECEIVER ····3
3.2 GENERAL SPECIFICATION ····3
CHAPTER 4. INSTALLATION ····5
4.1 UNPACKING & CHECK ····5
4.2 SELECT INSTALLATION'S SPACE ····5
4.3 POWER CONNECTION ····5
4.4 CONNECT WITH EXTERNAL DATA ····5
4.5 INSTALLATION OF GPS ANTENNA ····6
4.6 INSTALLATION OF DGPS(OPTION) ····6
4.7 COMPOSITE CONNECTION ····7
CHAPTER 5. OPERATION ····8
5.1 FUNCTIONS ····8
5.2 FRONT BOARD ····13
5.3 DISPLAY SELECTION ····15
5.4 NAVIGATION SCREEN ····16
5.5 PLOTTER SCREEN DISPLAY & FUNCTION ····17
5.6 HIGHWAY SCREEN SETTING ····19
5.7 STEERING ····20
5.8 USER DISPLAY ····21
5.9 MENU ····22
5.10 MENU STRUCTURE & INITIAL SETTING VALUE ····23
CHAPTER 6. HOW TO SET-UP & PROCESS ····24
6.1 NAVIGATION ····24
6.2 SET-UP PLOTTER ····27
6.3 ALARMS SET-UP ····28
6.4 ERASE ····28
6.5 DGPS ····29
6.6 CALCULATE ····30
6.7 MESSAGES ····31
6.8 SATELLITE ····32
6.9 USER DISPLAY ····33
6.10 GPS SET-UP ····34
6.11 SYS SET-UP ····35
6.12 I/O SET-UP ····36
CHAPTER 7. BLOCK DIAGRAM
CHAPTER 8. PACKING LIST

# CHAPTER 1. OVERVIEW

## 1.1 OVERVIEW

Thank you for purchasing SPR-1400.
We would be appreciate to read detailed manual and then keep it.
SAMYUNG has intelligent property rights for software and hardware of SPR-1400.
Therefore illegal copy of this product is not allowed.
This GPS is proud of high-tech navigation, however component navigator should follow his decision for person and property loss, not GPS receiver.
This product is the lion among existent navigation equipments. But when there is a possibility if losing person's life or fortune, you don't want to depend on this GPS only.
We guarantee to our dear customers good SERVICE and quality of SPR-1400.

## 1.2 WHAT IS GPS

GPS(Global Positioning System) is on the basis of position, velocity, time systems with spec, control, users. GPS consist of 24 satellite in orbit. This satellite turn around 12 circle, inclined 55 20200 Km far form earth. The interval of this satellite is PDOP=6. World people can see at least 4 satellites in orbit.
This satellite transmits L1(1575.42 MHz) and L2(1,227.6 MHz) with "L"band. L1 transmits P code and C/AZHEM, L2 transmits P code. All data message go to these code. Both frequency transmit same navigation data.
At first GPS purpose to use in military service until now, however USA admit GPS to use in civil category. IGPS(International GPS Service for geodynamics) supervise GPS.

## 1.3 FEATURES

1. Compliant to IMO and MSC.
2. Available to be used in range of power consumption.
   Compact design for easy installation job.
3. Easy to operate as graphic LCD with large range of visual field angle.
4. Can search for current satellite because of edit time and position value.
5. Adjustable the lightness of LCD, back light bright, it is very useful at night.
6. Can use to input-output data(NMEA 0183 and etc.) and others.
7. Can input the information about waypoints, markers routes to PC and output from PC.
8. There are various display mode and can setup the mode by user.
9. Convenience operation by using plotter function during waypoints navigation and route navigation.
10. Various kinds of alarms and self-test function for safe navigation.

## 1.4 CAUTION

This receiver be manufactured under the professional experience for a long time and accumulated knowledge. Therefore please do not change the original figures, circuits, systems of itself without technical advise.
The product can keep the best condition of it by professional technicians and engineers for maintain and repair.
if you need help for after service, please do not hesitate to contact us.

# CHAPTER 2. COMPONENT

## 2.1 BASIC COMPONENT

| ITEM | | MODEL | Q'TY | REMARKS |
|---|---|---|---|---|
| MAIN UNIT | | SPR-1400 | 1 SET | |
| ANTENNA & CABLE | GPS | SAN-60<br>RG-58C/U<br>(Connector Incl.) | 1 SET<br>10M | |
| | DGPS | SANB-300<br>Cable(Connector Incl.) | 1 SET<br>15M | |
| DC Power Cable,<br>Installation material,<br>Instruction manual | | Cable(Connector Incl.)<br>(Regard packing list)<br>Korean, Russian and English | 3M<br>1 SET<br>1 EA | Option |

## 2.2 OPTION

| ITEM | MODEL | Q'TY | REMARKS |
|---|---|---|---|
| AC POWER SUPPLY<br>AC POWER CABLE<br>AC POWER | SP-100<br>Cable (Connector Incl.)<br>(Regard packing List) | 1 SET<br>3M<br>1 LOT | |

# CHAPTER 3. SPECIFICATION

## 3.1 GPS RECEIVER

1) Antenna

1-1 GPS

① Center Frequency : 1575.42 MHz

② Dimension & Weight :90(H)x65(W)mm (127mm mounting bar) 0.15kg

1-2 DGPS(Option)

① Receiving frequency : 283.5 ~ 325KHz

② Channel interval : 500Hz

③ MSK Bit Rates : 50, 100, 200(Automatic)

④ Dimentions & Weight : 14(H)x115(W)mm (127mm mounting bar) 0.72Kg

2) Receiver

① Receiving frequency : 1575.42±1 MHz

② Receiving Channel : 12 Channels

③ Receiving Code : C/A code(1.023 MHz chip rate)

④ Tracking Capacity : 12 simultaneous satellite vehicles

⑤ Receiving Sensitivity : -130 dBm and below
(After picking up the signal, -133 dBm and below)

## 3.2 GENERAL SPECIFICATION

1) Accuracy

① Tracking velocity : 1,000 Knots(514 m/s)

② Ststic precision : Measure antenna's position error at HDOP=4 or PDOP=6
* GPS : Errors in the range of 100m(95%)
* DGPS : Errors in the range of 10m(95%)

③ Dynamic precision : Measure vessel's position error at HDOP=4 or PDOP=6 (In the ocean)
* GPS : Errors in the range of 100M(95%)
* DGPS : Errors in the range of 10M(95%)

④ Resolution : 1/1000 latitude & longitude

⑤ Velocity precision : 0.1 Knots RMS, HDOP<2.0 (Without SA)

⑥ Accuracy time : Warm start average < 13 Sec.
Cold start average < 105 Sec.

⑦ Up-date interval of accuracy data : Every 1 Sec.

2) Input data & Output data

① Data 1 : Input RS-232c, Output RS 232C & TTL
* Input data : NMEA0183 Ver 1.5 & Ver 2.0
* Output data : NMEA0183 Ver 1.5, NMEA0183 Ver 2.0
FURUNO CIF
Input in personal computer (WAYPOINTS/ROUTES DATA)
Output in personal computer (WAYPOINTS/ROUTES DATA)

② Data 2 : RS-232C
* Input Data : DGPS input signal (RTCM SC-104, Version 2.1)

3) General Information

① Display unit : 128 * 64 Dot LCD

② Display mode : Plotter mode, Steering mode, Highway mode,
NAV data mode, user mode(Digital, Speed meter)

③ Enlarging display
* Plotter mode : 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 160, 320nm
* Highway mode : 0.2, 0.4, 0.8, 1, 2, 4, 8, 16nm

④ Memory capacity : WAYPOINT/MARK/MOB etc. (Total 1,000 items),
Routes 50 units (Each route - 30 WAYPOINT),
Track 1,000 points

⑤ Protection circuit : Even if antenna or input-output terminal is under situation like short-circuit or grounding, don't sustain permanent damage.

⑥ Temperature : Antenna -40 ~ +85℃
Main unit : -20 ~ +55℃

⑦ Humidity : 95% (+30 ~ +60℃)

⑧ Power supply : DC10 ~ 36V/0.08 ~ 0.3A (Max. 4W)

⑨ Dimensions & Weight : 190(W)*112(H)73(D)mm
(Installation prop incl.) / 0.9Kg

4) Performance standard

① Compliant with IMO Res. A. 819(19)

② Compliant with MSC-112(73)

③ Compliant with ITU-R M.823

# CHAPTER 4. INSTALLATION

## 4.1 UNPACKING & CHECK

Should confirm same products as you ordered and external shape be checked.
If finding some damage, should take equivalent actions or contact us.
This receiver is easy to install according to vessel's conditions. At least User should follow this instruction of manual.

## 4.2 SELECT INSTALLATION'S SPACE

1) Space for good ventilation and checking and maintenance.
2) Space far from rain and sea's water, keep dry.
3) Space for avoiding sunlight.
4) Space for low vibration.
5) Space far from another electrical device.

## 4.3 POWER CONNECTION

1) 2P connector at the rear panel is for power supplying.
   No.1 is (+), No.2 is (-). Connect DC between 10V and 36V.
2) After 2P plug(for supplying power) connect with 2P cable, be careful of (+)(-) polarity.
   * Power cables have white (+) and black (-) colors.

## 4.4 CONNECT WITH EXTERNAL DATA

The connector is for input & output the data which interface with other equipment. It is available for RS-232C input & output and TTL level output.

1. 4P connectors at the rear side have functions following each pin number.

| Connector No. | Pin name | Functions |
|---|---|---|
| 1 | Data RX | Connecting with external equipment (input RS-232C) |
| 2 | Ddata TX | Connecting with external equipment (output RS-232C) |
| 3 | Ddata TTL | Connecting with external equipment (output TTL level) |
| 4 | Ddata COM | Connecting with external equipment |

2. Signals of connector No.2 and No.4 have same polarity.
   The difference : Connector No.3's signal level is outputting as 0V(L) or 5V(H) TTL level.

4.5 INSTALLATION OF GPS ANTENNA

Refer to external connecting drawings for GPS antenna. Keep over 1m distance far from another antenna and interference. Should not expose connecting side for water proof.

1. When connecting antenna, power supply is supposed to be off.
   Press **ON/OFF** key for three sec.
2. The higher place it is, the better for installation antenna.
3. It is supposed to be installed far from the antenna of radio transmitter.
   Especially install the GPS antenna in the different height from high output-radar antenna and VHF or UHF transmitting antenna.
   This kind of effect from transmitters might harm antenna and main unit.
4. Tighten up RF connector with main unit.
   And RF connector to antenna should take waterproofing.

4.6 INSTALLATION OF DGPS(OPTION)

For DGPS antenna, 7P connectors at the rear side have functions following each pin number.

| Connector No. | Pin Name | Functions |
|---|---|---|
| 1 | Data TX | DATA TX (output RS-232C) |
| 2 | Data RX | DATA RX (input RS-232C) |
| 3 | Ddata COM | DATA COM |
| 4 | Earth | Grounding (Connect to case) |
| 5 | Interface | NA |
| 6 | Power - | Power supply - |
| 7 | Power + | Power supply + |

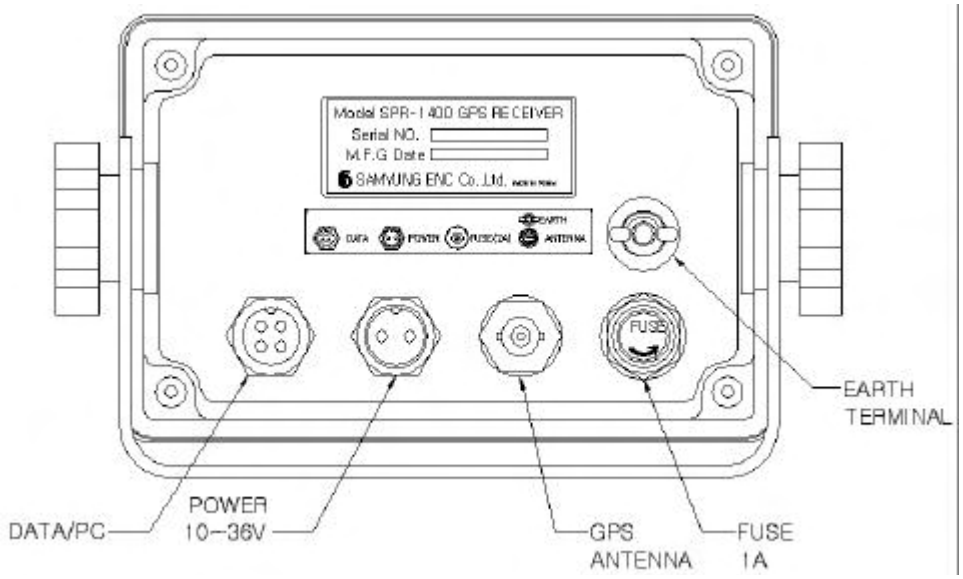
1. DGPS antenna : Please refer to "4.5 Installation of GPS antenna".

4.7 COMPOSITE CONNECTION

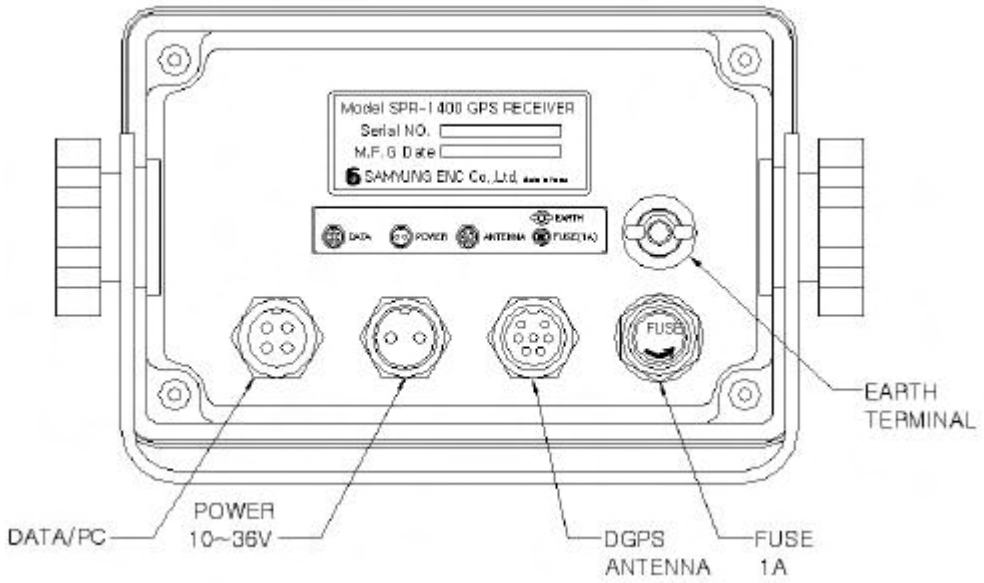
Refer to block diagram for external connection, install at convenient space.

1. DC cable for power should be supplied by SAMYUNG or it should has enough capacity current.
2. Antenna connector of navigation equipment, power connector, data out connector should be tightened.

**<GPS>**




**<DGPS>**



# CHAPTER 5. OPERATION

## 5.1 FUNCTIONS

Power on/off and adjusting illumination

ON/OFF * Press this key more than one sec. : On
* Press this key more than two sec. : Off
* When the power is on, press this key less than one sec.
: Adjusting illumination

1. Operation of navigation

1) Registration of way point or mark

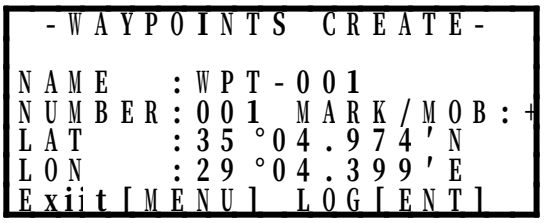
(MENU)→◈<NAVIGATE>→(ENT)→◈<WP/MARK CREATE/VIEW>→(ENT)→▲,▼→(ENT)

* Input WAYPOINT name, WAYPOINT number, Kind of Mark, Longitude and Latitude.

→◈<LOG>→(ENT) : Input

→◈<Exit> → (ENT): Cancellation input

→(MENU) : Cancellation input




<Input waypoints or mark>

2) Registration of MOB(Man overboard)

(MENU)→◈<NAVIGATE>→(ENT)→◈<WPT/MARKCREATE/VIEW>→(ENT)→▲,▼→(ENT)

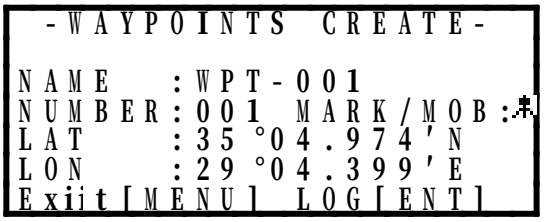
* Select "⁂" in <Mark Create>.

* Input(or correct) Name(the next spot of "MOB "), Number, Longitude and altitude.

→◈<LOG>→(ENT) : Input

→◈<Exit> →(ENT) : Cancellation input

→(MENU) : Cancellation input




<Registration of MOB>

3) Registration of ROUTES

(MENU)→<NAVIGATE>→(ENT)→<ROUTES CREATE/VIEW>→(ENT)→▲,▼→(ENT)

* Input route name, number, way point number, route order, route beginning.

→ <LOG>→ (ENT) : Input

→ <Exit> → (ENT) : Cancellation input

→ (MENU) : Cancellation input

```
   --ROUTES CREATE--
NAME:RUT-01      NO.01
   01  WPT-001    +  001
   02
   03
   04
Exit[MENU]  LOG[ENT]
```

<Registration of route>

4) Selection of Next Way Point

(MENU)→<NAVIGATE>→(ENT)→<NEXT WAYPOINT Select>→(ENT) →▲,▼(WAYPOINT number)

(ENT)→(MENU) : Input

(MENU)→(MENU) : Cancellation input

```
      WPTS/MRKS  LIST
01   01   001   WPT-001    +
01   02   002   WPT-002    x
--   --   003   WPT-003    o
--   --   004   WPT-004    □
01   03   005   WPT-005    *
--   --   006   WPT-006    ^
```

<Next Waypoints>

5) Selection of Next Route

(MENU)→<NAVIGATE>→(ENT)→<NEXT ROUTES Select>→(ENT)→▲,▼(Select ROUTES number)→

(ENT)→▲,▼(Select WAYPOINT number)

(ENT)→(MENU) : Input

(MENU)→(MENU) : Cancellation input

```
      ROUTES  LIST
01   RUT-01      04
02   RUT-02      07
03   RUT-03      12
04   RUT-04      05
05   RUT-05      07
06   RUT-06      20
```

<Next Route>

2. Calculate distance, direction, time

1) Calculate from Daughter ship to Way point.

(MENU)→<CALCULATE>→(ENT)

* Mode Selection :→<MODE:WAYPOINTS>→(ENT)

* Selection Beginning point :→<FORM:SHIP>→(ENT)

```
    --CALCULATION--
MODE:WAYPOINT
FROM:SHIP
TO  :001
SPD :AUTO      12.6kt
TTG:           ETA:
RNG:000.2nm    BRG:002
```

<Calculate ROUTES>

* Selection Calculation place :
→<TO:xxxxxxxx>→(ENT)→<Selection of WAYPOINTS>→ (ENT)
* Enter Speed of the vessel : →<SPD:AUTO>→(ENT)
* Display calculated TTG, ETA, RNG, BRG.
(MENU) : Back to the main menu.

2) Calculating Between WAY POINT and WAY POINT
From Above “1)” Beginning point, it should be choice “FORM: WAYPOINTS".

3) Calculating ROUTES

(MENU)→<CALCULATION>→(ENT)

* Selection Mode : →<MODE:ROUTE>→(ENT)
* Selection routes : →<ROUTES number>→(ENT)

```
    --CALCULATION--
MODE:ROUTE          (R=01)
FROM:01             (W=001
TO  :02             (W=002
SPD :AUTO      12.6kt
TTG:           ETA:
RNG:000.0nm    BRG:002'
```

<Calculate ROUTES>

* Selection Beginning point :
→<FORM:>→(ENT)→<WAYPOINTS Number>→(ENT)
* Selection calculating point :
→<TO:>→(ENT)→<WAYPOINTS No>→(ENT)
* Enter Speed of the vessel : →(ENT)→<SPD:AUTO>→(ENT)
Note) : If you selected "MANU", input the velocity of daughter ship.

* It should be calculate and indicate TTG, ETA, RNG, BRG from beginning point to the last point to the last point.
(MENU) : Be back to the Main menu.

3. Establishment of Alarm

1) Select Mode

(MENU)→✥<ALARMS>→(ENT)→✥

* Select changing item:→(ENT)→▲,▼
* Change it.
* After all alteration or part alteration, →(MENU) : After inputting, Exit.

```
 - -  ALARMS SETUP  - -
BUZZER  :Short
ARRIVAL :Off      0.10nm
ANCHOR  :Off      0.10nm
XTE     :Off      0.10nm
SPEED   :Off     10.0kt
TRIP    :Off       100nm
```

<Alarm setup>

2) Range of selection

* BUZZER (Type of the alarm): SHORT, LONG, CONSTANT
* ARV/ANC (Alarm of the arrival & Anchor): Arrival/Anchor & 0.00 - 9.99nm
* XTE (alarm of the course secession): On/off & 0.00 - 9.99nm
* SPEED: OFF/BELOW(LOW SPEED)/Over(HIGH) & 00.0 - 99.9kt
* TIME: OFF/ON & 00:00 - 23:59
* TRIP (Alarm of trip distance): Off/On & 000~999nm

4. Output and Input of the data(I/O)

1) Output of the data (Storage in external memory)

(MENU)→✥<I/O SETUP>→(ENT)→✥<SAVE WP/RUT>→(ENT)

* ▲,▼(select WP DATA or RUT DATA)→(ENT) : After output, exit.
  (MENU) : After cancellation, exit
* DATA of WAYPOINT, MARK, MOB, ROUTES, TRACK be output in personal computer with RS-232C.

2) Input of the data from external memory.

(MENU)→✥<I/O SETUP>→(ENT)→✥<LOAD WP/RUT>→(ENT)

* ▲,▼(After selecting WP DATA or RUT DATA)→(ENT) : After input, exit.
  (MENU) : After cancellation, exit.
* DATA of WAYPOINT, MARK, MOB, ROUTES, TRACK be input in personal computer with RS-232C.

3) Set up input data

(MENU)→✥<I/O SETUP>→(ENT)→✥<INPUT DATA>→(ENT)

▲,▼(select one between INTERNAL or EXTERNAL.)→(ENT) : After setup, exit.

* INTERNAL is GPS receiver, EXTERNAL is inputting GPS.

4) Set up OUT FORMAT

(MENU)→✥<I/O SETUP>→(ENT)→✥<OUT FORMAT>→(ENT)

▲,▼(select one among NMEA VER1.5, NMEA VER2.0, FURUNO CIF.)→(ENT) : After setup, exit.

5. Set up system

1) Install Coordinate

* Select Mode : *WGS84*, WGS72, KOREA/TOKYO, NORTH AMER1927, EUROPEAN 1950, AUSTRALIAN 1984, ADIADAN, ETC. SET(001~171)

(MENU)→<SYS SETUP>→(ENT)→<DATUM>→(ENT)→▲,▼→(ENT)

2) Install Unit

* Select Mode : ***nm/kt***; mm/mh; km/kh

(MENU) →<SYS SETUP>→(ENT)→<UNIT>→ (ENT)→▲,▼→(ENT)

3) Install Time Difference

* Select Mode : +13:30~-13:30

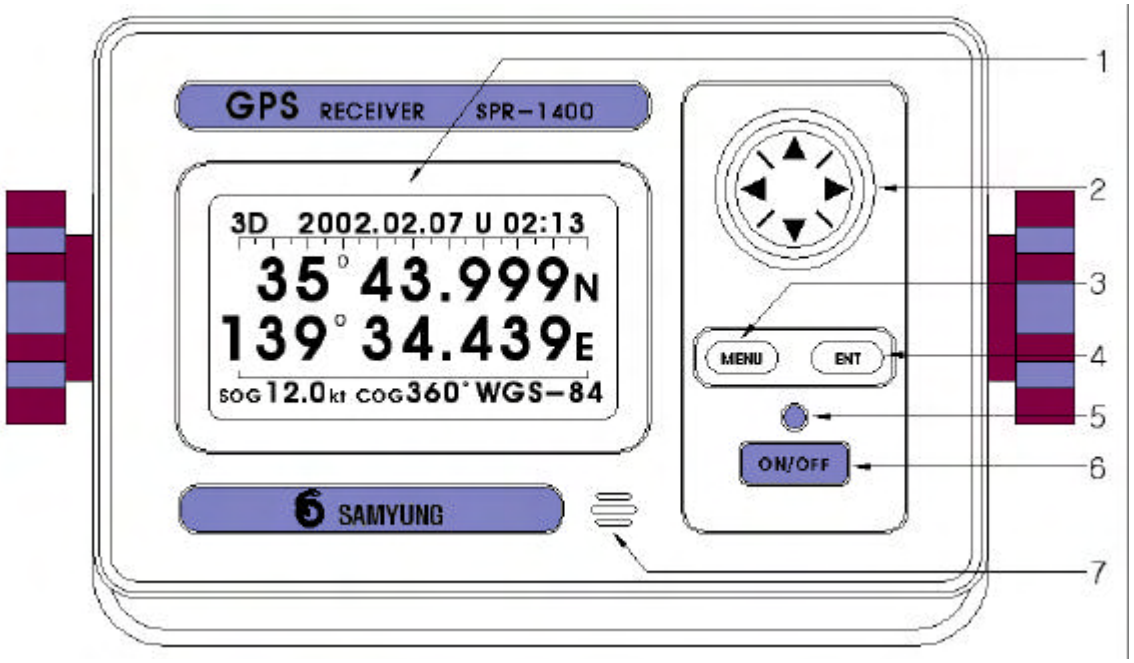
(MENU) →<SYS SETUP>→(ENT)→<TIME DIFF>→ (ENT)→▲,▼→(ENT)

4) Install Time Mode

* Select Mode : 12 hours, 24 hours

(MENU) →<SYS SETUP>→(ENT)→<TIME DISP>→ (ENT)→▲,▼→(ENT)

## 5.2 FRONT BOARD




1. Front LCD

It displays wide range of information. According to displaying mode with (ENT), it displays six kinds of GPS screen and various menu screen.

Display unit is setting either (nm, kt and nm, km/h) and 24hours or 12hours displaying methods which set up at units item in Menu.

2. (Direction key)

Using as a switch for choosing item in Menu screen or choosing setting value.

( ▲, ▼ switch in Main display screen can be adjusting brightness of LCD letter)

3. (MENU)

As a MENU selection switch, when Menu screen is presently being selected, it activates as a return switch to previous screen.

4. (ENT)

As a switch to input (for confirming set) setting value or function after selection at Menu screen, but it is activated by selection switch in 6 kinds of information display screen mode selection switch at information display screen at no Menu screen.

5. LED

When th unit is working properly, LED light comes up.

6. Switch [ON/OFF]

As a switch for Power supply and light adjusting.

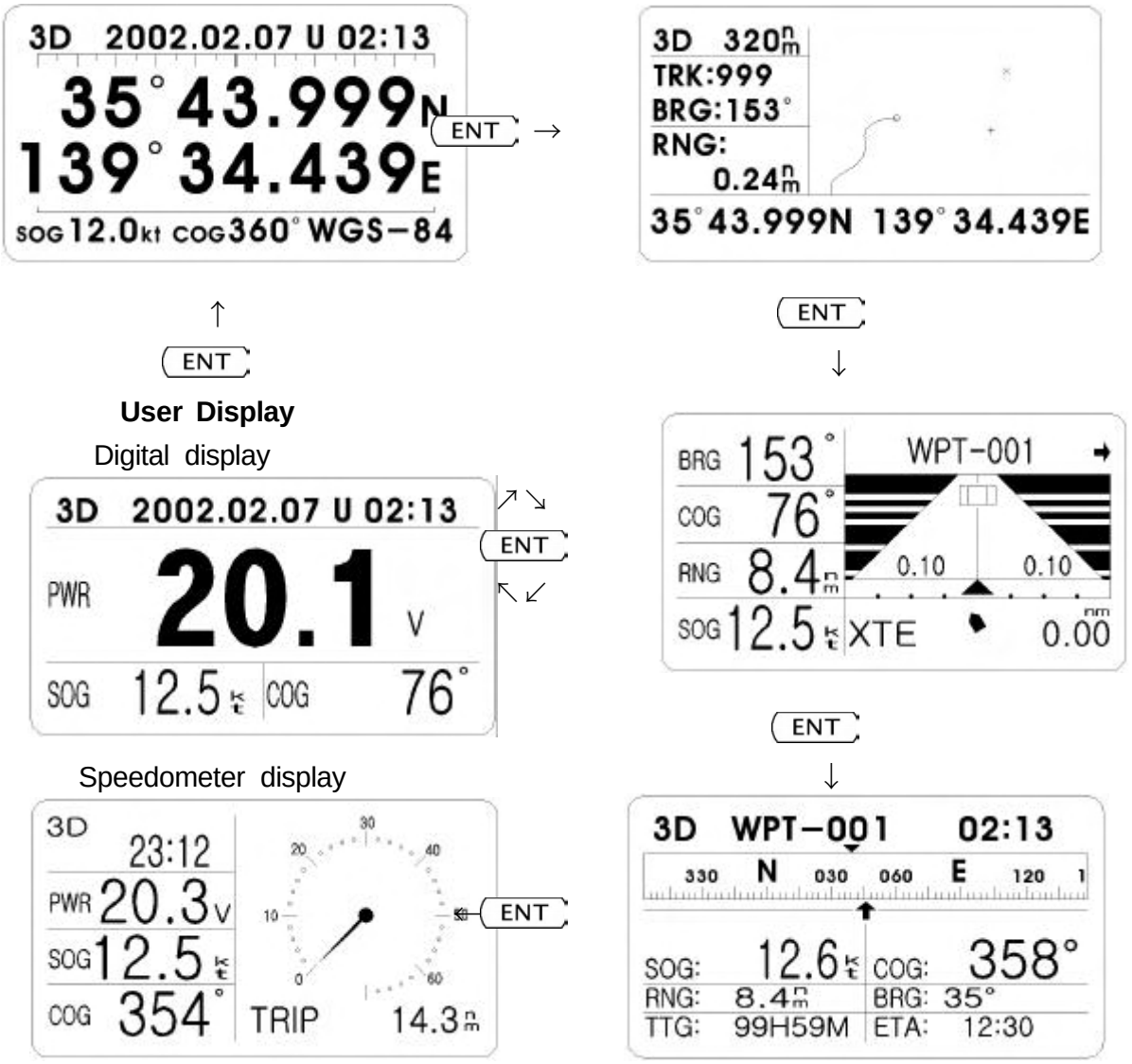
* For power supply on : press [ON/OFF] for one second.
* For power supply off : press [ON/OFF] for two seconds.
* For adjusting LCD light and switch Dimmer : press [ON/OFF] for one second.
  Note) If pressed over 1 second, power will be off.

7. Buzzer

When switch on, beep and alarm comes out.

5.3 DISPLAY SELECTION

1. If press (ENT), it changes a following screen.




2. Press (MENU) on Plotter MENU for the return to MAIN MENU.

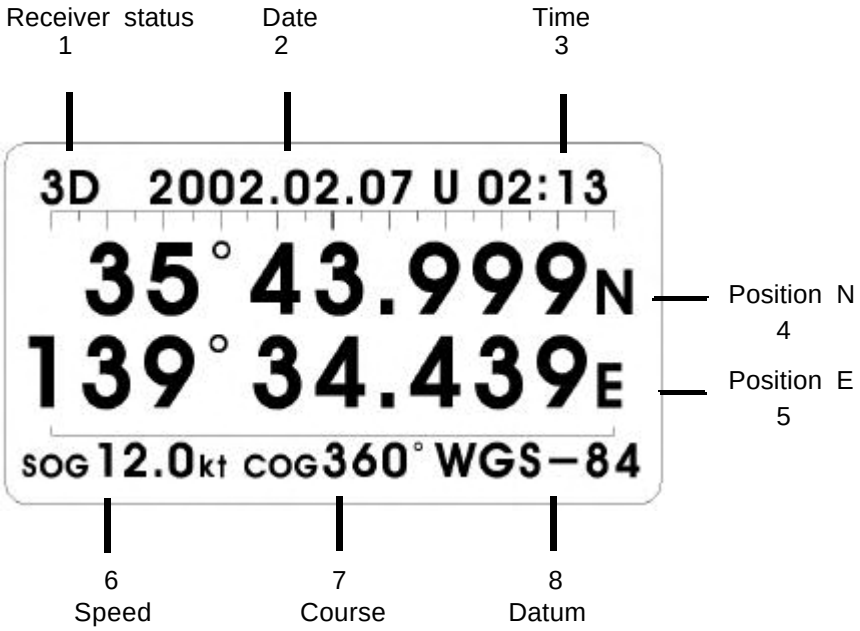
<PLOTTER MENU>

```
CURSOR  :Off
CENTER  :SHIP

Quit

 PRESS[MENU] TO
        MAIN MENU
```

<MAIN MENU>

```
----- Main Menu -----
NAVIGATE      MESSAGES
PLOTTER       SATELLITE
ALARMS        USER DISP
ERASE         GPS SETUP
DGPS          SYS SETUP
CALCULATE     I/O SETUP
```

5.4 NAVIGATION SCREEN




1. Receiver status (2D)
GPS Receiving Status : (" "/“DR”/“2D”/“3D”/"DGPS"/"GPS"/“SIM") “2D” shown at the top of the left side will be displayed “DR” when satellite is not being selected, while it displayed “2D” when the satellite is selected and 2 dimension is processing. When the 3 dimension is processing, it displays “3D”.
When it is not identified whether status is "2D" or "3D". Or outside input.
It displays "GPS". When it is in the process of receiving DGPS, it displays DGPS.
* When it is working with simulator, "SIM" is flickering at this place.

2. Date(2002.02.07)
It represents the present year, month and day.

3. Time(02:13)
It can display 24 hours type (10:07 16) or 12 hours type (10:07AM).
If time is not accurate, number is flickering. When "U" is displayed in front of time, it means UTC time, and in case of "L", it means Local time.

4. Latitude (35‘43.999N)
Ship's latitude : latitude at ship's location.

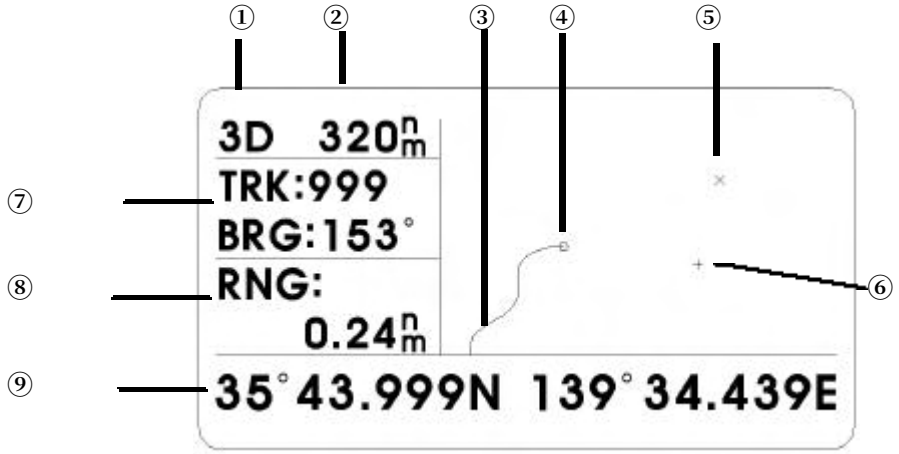
5. Longitude (139'34.439E)
Ship's longitude : longitude at ship's location.

6. Speed(SOG 12.0kt)
Ship's speed : The existing ship's moving speed which is relative against the land.

7. Course(COG 360')
Ship's direction : Ship's moving direction which is relative direction against the land.

8. Datum(WGS-84)
Datum : It displays presently using DATUM. If is set up by external data, it displays "EXTERN".

5.5 PLOTTER SCREEN DISPLAY & FUNCTION




1. Description on display

① Receiver status(3D)

GPS receiver status : “ ”, “DR”, “2D”, “3D”, “DGPS", ”GPS", "SIM".

* When it is working with simulator, “SIM" is flickering at this place.

② Horizontal display range setting (320nm)

It represents distance of horizontal width on the plotting screen.

It can set up 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 40, 80, 160, 320nm by adjusting direction switch like ◀(distance to be narrow), ▶(distance to be wide) without curse coming on the screen.

③ Boat's track(~)

It displays ship's track as a line (hereinafter called ship's track).

When it displays on the existing screen, it displays as muce details as possible, but when it calls the past track or memorized ship's track, it shows according ti ship's track memory width(Width is set at Menu.)

④ Own ship mark (o blinking) : It displays ship's existing position as a dot.

⑤ Waypoint mark(x Shape selectable) : it displays destination as a registered mark.

⑥ Cursor(+) : It displays cursor as "+" which functioned ON/OFF at menu screen.

⑦ TRK: -> Track Point(TRK:220)

It displays total track points so far recorded.

BRG: -> Bearing to cursor or Bearing to Course(BRG: 130°)

It displays direction for destination from existing position. When it displays "RNG:+", it means cursor position from the exsiting position.

⑧ Range to cursor or Range to Course(RNG:+ 8.4nm)

When "RNG:+8.4nm" comes on indicator, it means displayed distance for cursor point from the existing position.

⑨ Cursor position(35° 05.221 N 129° 04.180E)

When it displays cursor(+) on the indicator, it displays cursor's position, but when it is without cursor it displays boat position.

2. Setting-up the function

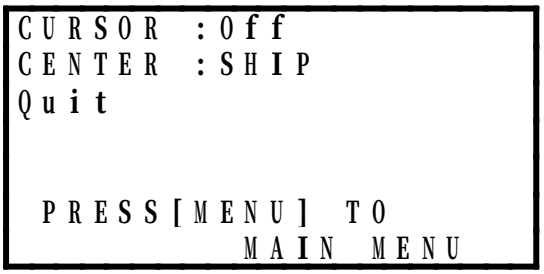
1) When menu switch is pressed on the plotter screen, menu screen for setting up the function comes up and being displayed as follows.

2) Press the direction switch on plotter menu screen for selected position with changing to letter mode and press for selection.

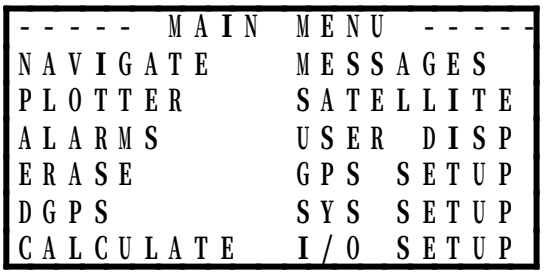
3) After changing to "Quit" letter on the indicator, press (ENT) then it returns to plotter screen.

4) Press "MENU" on the plotter screen, it changs to MAIN MENU.

<PLOTTER MENU>




<MAIN MENU>




5) Select CURSOR(ON/OFF)

It is function of setting-up whether it displays course on the plotter screen or not. When cursor is displayed, it also displays the value of course position like the distance from the vessel position to course. When the cursor is not displayed on the screen, it displays the value of the existing ship's position and the distance from the ship to waypoint, and when press the "◀" switch, screen magnification ratio becomes reduced and when press the "▶" switch, screen magnification ratio becomes increased.

When the cursor is on, if you move it : Central point of display will be changed as the spot of cursor.

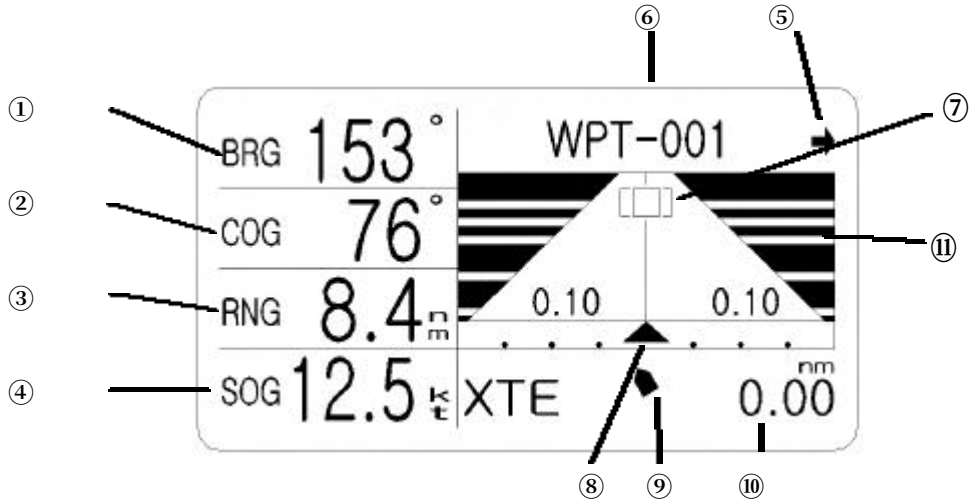
6) Select CENTER(SHIP/CURSOR/OFF)

Select the center of plotter screen as the ship's existing position or cursor position. Once selected, it automatically goes off.

* On plotter screen not selected center line with its cursor on.

Cursor position is on the center of screen(going out of the screen) when cursor is off, ship's position would be automatically the center of screen(time about going out of the screen).

## 5.6 HIGHWAY SCREEN SETTING




1. Bearing from own ship to destination waypoint (BRG 153°)
It displays direction towards destination form the present position.
* When it is working with simulator,"SIM" is flickering at this place.

2. Course(COG 76°) :It displays ship's moving direction.

3. Range from own ship to destination waypoint (RNG 8.4nm)
It displays distance from the present position to destination.

4. Speed(SOG 12.5kt) : It displays ship's moving speed.

5. Direction to steer(to return to course), (▶)
It displays when the present ship's direction differs from waypoint toward.
In order to go waypoint, it displays steering direction to right or left by arrow mark(◀ or ▶).

6. Destination waypoint name(WPT-001)
It displays waypoint name and designates name at MENU

7. Destination waypoint([ ]) : It displays MARK of waypoint

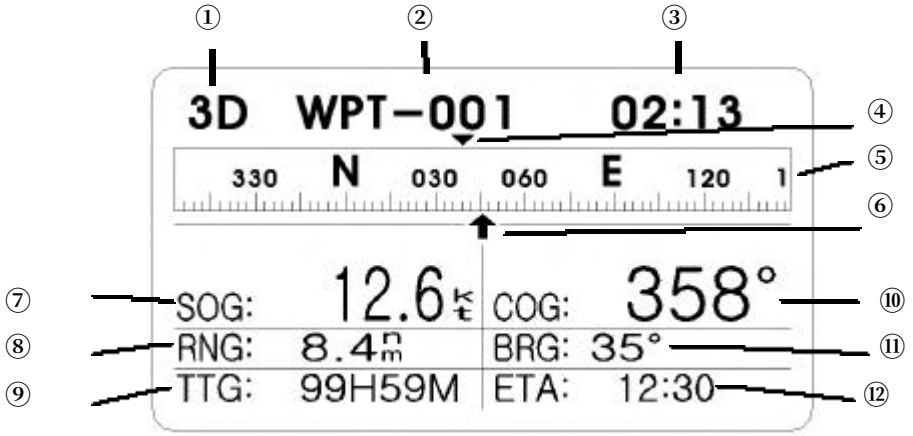
8. Analog XTE(Cross-track error) scale
When the ship is out at sea , the course off distance is displayed to ▲ on analogue scale.
If the waypoint is not set up, ▲ mark is displayed to "N".

9. △ (Delta Course)
When it does not set up waypoint, the ship's direction is displayed to arrow at North up Mode(top side is North, downward is South). If it sets up waypoint, it displays the going direction of ship's direction

10. Digital XTE indication(0.00nm)
When the ship is out at sea, the course off distance is displayed to arabic number.
(Aforesaid clause 8, Analogue is displayed to Digital)

11. According to speed of ship's direction, it differs from moving speed on the display.

5.7 STEERING




1. Receiver status(3D) : When the status is on the GPS receiving
   It displays “DR”,“2D”, “3D”, "DGPS", "GPS", "SIM" under the GPS receiving condition
* When it is working with simulator,"SHIM" is flickering at the place

2. Destination waypoint name(WPT-001) : It displays the name of next waypoint, and designates its name on MENU

3. Time(02:13) : It displays the present time.(Ex. 21:34 or 09:34P)

4. Bearing from own ship to destination (▼) :
   It displays direction with (▼) towards destination from the present position.
   E.G) In case that present position is 345' and destination form the present position is +66',the desired position will be displayed upper center arrow mark() and the mark (▼) of destination will be displayed on 60' of Analogue direction scale.

5. Bearing scale (Analogue scale) : The Scale center position is set up as the present ship's direction, and it displays +90 (left side) with scale and number

6. Own ship mark (↑) : The Arrow mark will be displayed on the center of analogue screen, and position value of analogue style scale will be displayed present ship's position.

7. Speed(SOG 12.6kt) : It displayed ship's moving speed

8. Range from own ship to destination (RNG 8.4nm) : It displays distance form the present position to the destination.

9. Time-To-Go(TTG 99H59) : It displays that arrival time shows max.99hr.59min.

10. Course(COG 358°) : It displays ship's moving direction.

11. Bearing (BRG 35°) : It displays the direction of destination.

12. Estimated Time of Arrival at destination(ETA 12:30) : It displays the estimated arrival time at destination

5.8 USER DISPLAY

It, user display, displays the selected screen by user either digital display screen or speedometer screen, and the parts of contents(3 items out of SOG, COG, RNG, BRG, TTG, ETA, TRIP, PWR) being displayed on the screen can be set up by user.

1. Speedometer Display

① : Receiver status(3D) & Time(23:12)
It displays GPS receiving status(" ","DR","2D","3D","DGPS","GPS","SIM") and the present time. (This item can not be selectable)
* When it is working with simulator,"SHIM"is flickering at this place.
② : It displays by user after selection out of SOG,COG,RNG,BRG,TTG,ETA,TRIP,PWR
③ : It displays by user after selection out of SOG,COG,RNG,BRG,TTG,ETA,TRIP,PWR
④ : It displays by user after selection out of SOG,COG,RNG,BRG,TTG,ETA,TRIP,PWR
⑤ : Speedometer(Analogue type meter)
It displays ship's moving speed with bar type scale on the analogue type round scale meter. (This item can not be selected)
⑥ : Trip Distance
It displays a navigation distance.(This item can not be selected)

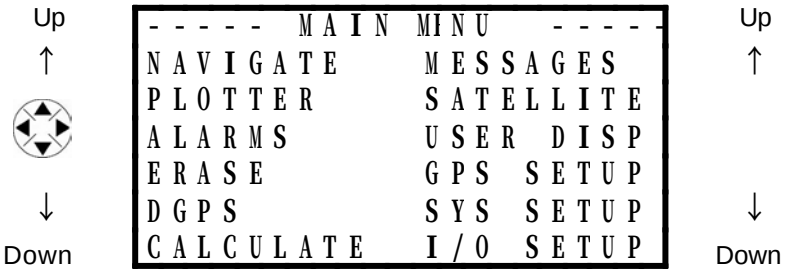
2. Digital Display

① : Receiver status(3D) & Date(2002.02.07) and Time(U 02:13)
It displays GPS receiving status (“ ”,“DR”,“2D”,“3D”,"DGPS","GPS",“SIM") and the present date (year, month, day) and Time with either 24 hours system and 12 hours system.
* When it is working with simulator, "SHIM" is flickering at the left side of this place.
② : It displays by user after selection out of SOG,COG,RNG,BRG,TTG,ETA,TRIP,PWR.
③ : It displays by user after selection out of SOG,COG,RNG,BRG,TTG,ETA,TRIP,PWR.
④ : It displays by user after selection out of SOG,COG,RNG,BRG,TTG,ETA,TRIP,PWR.

3. User setting item
A. SOG(Speed) : It displays ship's moving speed.
B. COG(Course) : It displays ship's moving direction.
C. RNG(Range from own ship to destination) : It displays distance form the present position to the destination.
D. BRG(Bearing from own ship to destination waypoint) : it displays direction form the present position to the destination.
E. TTG(Time-To-Go) : It displays time required to the destination with max.99hrs 59min.
F. ETA(Estimated Time of Arrival at destination) : It displays the estimated time of arrival at destination.
G. TRIP(Trip Distance) : It displays navigation distance.
H. PWR(Power) : It displays input power.

5.9 MENU

After pressed (MENU) switch on the front of machine, the following pictures are displayed on Main Menu screen. The present selected item of whi<Next Route>ch letter are displayed up and down. After selected the item with ▲, ▼, ◀ and ▶ and press (ENT), then the detail menu will be displayed.
When (MENU) switch is pressed in the main menu screen, it will return to Main display screen (the screen just before changing to MENU screen such as Plotter screen or Navigator screen).
MAIN MENU




Left ← → Right

## 5.10 MENU STRUCTURE & INITIAL SETTING VALUE

| | | |
|---|---|---|
| MENU | PLOTTER DISPLAY MODE | CURSOR(ON,*OFF*), CENTER(SHIP, CURSOR, *OFF*) |
| | NAVIGATE | WPT/MARK Create/View -> Waypoint or Mark creation & List |
| | | ROUTES Create -> Routes & List |
| | | NEXT WAYPOINT Select |
| | | NEXT ROUTES Select |
| | | ANCHORAGE Select |
| | | NAVIGATION Cancel |
| | PLOTTER | TRACK REC(OFF,DISTANCE,*TIME*) |
| | | INTERVAL(*30sec*)->Set up the route record interval |
| | | BRG. REF(MAG,*TRUE*) |
| | | MAG.VAR(*AUTO*,MANUAL) |
| | | WYPT MARK(*DSP GOTO*,DSP ALL) |
| | | RESET TRIP |
| | ALARMS | BUZZER(*SHORT*,LONG,CONSTANT)- |
| | | ARRIVAL(*OFF*,ON/*0.10nm*) |
| | | ANCHOR(*OFF*,ON/*0.10nm*) |
| | | XTE(*OFF*,ON/*0.10nm*) |
| | | SPEED(*OFF*,BELOW,OVER/*10.0kt*)- |
| | | TRIP(*OFF*,ON/*100nm*) |
| | ERASE | WAYPOINTS/MARKS |
| | | ROUTES |
| | | TRACK |
| | | MENU SETTINGS |
| | | ERASE ALL |
| | CALCULATE | MODE(*WAYPOINT*,ROUTE),SPD(*AUTO*,MANUAL) |
| | | FROM(*SHIP*,WAYPOINT) |
| | DGPS | MODE(*AUTO*,MANU) |
| | | FREQUENCY(*280.0KHz*) |
| | | SPEED(25,50,*100bps*,200) |
| | MESSAGES | |
| | SATELLITE | |
| | USER DISP | USER DISP(DIGITAL,*SPDOMETER*)-> |
| | | LARGE/TOP(*SOG*,COG,TTG,ETA,RNG,TRIP,BRG,PWR) |
| | | LEFT/MIDDLE(SOG,*COG*,TTG,ETA,RNG,TRIP,BRG,PWR) |
| | | RIGHT/LOWER(SOG,COG,TTG,ETA,*RNG*,TRIP,BRG,PWR) |
| | GPS SETUP | SMOOTH POS(0~999 SEC,*0 SEC*) |
| | | SMOOTH S/C(0~999 SEC,*10/10 SEC*) |
| | | AVR.SPEED(0~99 MIN, *99 MIN*) |
| | | LAT OFFSET(*+00.OO'*) |
| | | LON OFFSET(*+00.OO'*) |
| | | FIX MODE(2D/*,2/3D*)For 2D,default antenna height is 5m |
| | SYS SETUP | DATUM(*WGS84*, WGS72, KOREA/TOKYO, NORTHMER1927, EUROPEAN1950, AUSTRALIAN 1984, ADIADAN,ETC. SET(No.001~171)- |
| | | UNITS(*nm/kt*; km/kh; mm/mh) |
| | | TIME DIFF(*+00:00*) |
| | | TIME DISP(12HOUR,*24HOUR*) |
| | | SIMULATOR(*off*,low,mid,high) |
| | I/O SETUP | INPUT DATA(*INTERNAL*,EXTERNAL) |
| | | OUT FORMAT(NMEA V1.5,*NMEA V2.0*,FURUNO CIF) |
| | | SAVE WP/RUT |
| | | LOAD WP/RUT |

## 6. HOW TO SET-UP & PROCESS

### 6.1 NAVIGATATION

Select "NAVIGATE" on the (MENU), will be displayed on the screen as follows;
Available to set up waypoints, mark & route. Also see contents, compile and assign next route on the "NAVIGATE" menu. After converse of letter with direction button, press (ENT) to see the sub-menu

```
----  NAVIGATE  ----
WPT/MARK    Create/View
ROUTES      Create/View
NEXT WAYPOINT   Select
NEXT ROUTES     Select
ANCHORAGE       Select
NAVIGATION      Cancel
```

<NAVIGATATION>

1. WAYPOINTS, MARK, MOB setup
Select WPT/MARK Create/View and show up the screen of list as follows

```
     WPTS/MRKS LIST
01   01   001  WPT-001   +
01   02   002  WPT-002   x
--   --   003  WPT-003   o
--   --   004  WPT-004   □
01   03   005  WPT-005   *
--   --   006  WPT-006   ^
```

<WAYPOINTS/MARK LIST >

```
 -WAYPOINTS CREATE-

NAME   :WPT-001
NUMBER:001  MARK/MOB:+
LAT    :  35°04.974'N
LON    : 129°04.399'E
Exiit[MENU]  LOG[ENT]
```

<WAYPOINTS/MARK setup>

1) Available to set up Latitude & Longitude on the WAYPOINT/MARK setup screen.
2) NAME Setup
* Press ✥ to be NAME function (converse letter), press (ENT).
One letter will be twinkle on the location of name input.
For setup NAME, select the location of letter by ✥. Press (ENT) and input letter. if pressing (MENU), return to previous screen.
* In case of selecting "MARK/MOB", the front four letters is fixed to "MOB". Therefore, it is available to change four letters among eight letters.

3) NUMBER Setup
* Press ✥ to converse of NUMBER letter, press (ENT).
Available to input the figures(000-999) by selecting the position of figure & figures by ✥ and press (ENT).

4) Select MARK/MOB
* Press ✥ to converse MARK/MOB letter, press (ENT) and select MARK by ✥.
* If selecting 🚹 , it will be MOB(Man overboard), available to change 4 letters among 8 letters. The four letters are fixed to MOB.
* The kinds of "MARK" are as follows.

5) Input Latitude(LAT)
* Press direction button to converse LAT letter, press "ENT". Select the location & letter by ✥, press (ENT) for setup.

6) Input Longitude(LON)

* Press ✥ to converse LON letter, press [ENT].

Select the location & letter by ✥, press [ENT] for setup.

7) After all setup completed, make the letter of "LOG "converse and [ENT].

And press [MENU] or make the letter of [ENT] converse by ✥ for the return to main screen.

NOTE) If pressing [MENU] or select [ENT] and press [ENT] for the return to main screen without saving current information.

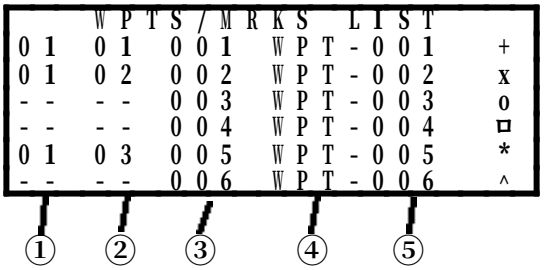
Before pressing [ENT], select "LOG" and press [ENT].

2. WAYPOINTS, MARK, MOB

If selecting WPT/MARK Create/View, show up screen list.

1) It will be shown up six lines at one time

If selecting ✥, available to see all information.




2) Press [MENU] on the screen-"WPTS/MARKS LIST".It will be back previous screen. Press [ENT] on the screen-"WPTS/MARKS LIST". Available to modify setup information.

3) Contents displayed as follows:

① "ROUTE NO" (Set up destination at the ROUTES NAVIGATION)

② "COURSE NO" (Set up destination at the ROUTES NAVIGATION)

③ WAYPOINTS NO (Assigned at the setup screen, display in a number orer)

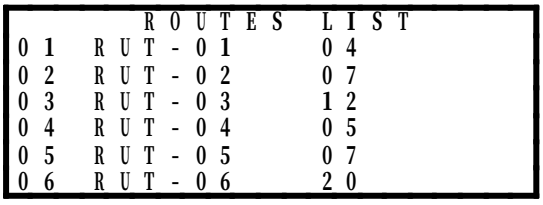
④ WAYPOINTS NAME (Assigned at the setup screen)

⑤ MARK (Assigned at the setup screen)

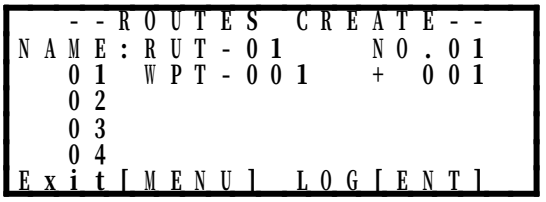
3. ROUTES setup

Select ROUTES Creat/View, show the screen of ROUTES LIST.

If pressing [ENT] at the position which is for modifying or setup, show the setup screen.




<ROUTERS LIST >




<ROUTERS setup screen>

1) NAME setup

* Press direction button to converse NAME letter, press [ENT].

Show the screen for letter selection and select the letter by ✥ and press [ENT].

2) NUMBER setup

* Press ✥ to converse NUMBER letter, press [ENT].

Select the figure's position and figure(01-50) by ✥ and press [ENT].

3) Setup Waypoints

* After pressing ✥ to converse waypoints number which will set up, press [ENT] and show up the screen of WAYPOINTS LIST. Make a waypoints number to converse by ✥, press [ENT].

4) Modification or Deletion Waypoints

* After conversing waypoints number, press [ENT]. Be shown up "Erase WPT? & "YES NO". Choose "YES" and press [ENT] for the cancellation of waypoints.

If you choose "NO", available to set up waypoints again.

5) After all setup, make a "LOG" converse and press [ENT]. It will be saved the setup information on setup location.
Press [MENU] or make a "EXIT" letter by ✥. It will be back the main screen.

Assign setup waypoints name or waypoints No. and available to set up route starting, route progress and final destination for selecting destination.
To set up waypoints or waypoints No. Make a converse the setup location of waypoints name and No. and press [ENT]. Move to the location of letter by ✥ and set up waypoints name and No.

Note) If selecting [MENU] or "EXIT" and press [ENT], it will be back a main screen without saving current information, select "LOG" and press [ENT].

4. Display Contents Of Routes Setup

Select "ROUTES LIST", show the screen up as follows:

1) It shows up 6 lines.
If selecting ✥, available to see all information.

```
          ROUTES  LIST
01   RUT-01      04
02   RUT-02      07
03   RUT-03      12
04   RUT-04      05
05   RUT-05      07
06   RUT-06      20
     ①      ②      ③
```

2) If selecting [MENU], available to see previous screen and select [ENT] and modify information

3) Displayed contents as follows
① ROUTE No.
② ROUTE Name
③ Total number of WAYPOINTS

5. Set up next WAYPOINTS
If select next WAYPOINTS, show up the screen as follows;

1) It will be shown 6 lines if selecting ✥.
   Available to see all information.
2) If selecting [MENU], available to see previous screen.
   If selecting [ENT], available to modify information.

```
     WPTS/MRKS  LIST
01   01   001   WPT-001   +
01   02   002   WPT-002   x
--   --   003   WPT-003   o
--   --   004   WPT-004   □
01   03   005   WPT-005   *
--   --   006   WPT-006   ^
```

6. Set up next ROUTES
1) If select next ROUTES, show up the screen as follows;
If selecting [MENU], available to see previous screen. If selecting [ENT], avaliable to modify information.
2) Display ROUTE LIST with 6 lines at one time.
Available to see all set up information by ✥.

```
          ROUTES  LIST
01   RUT-01      04
02   RUT-02      07
03   RUT-03      12
04   RUT-04      05
05   RUT-05      07
06   RUT-06      20
```

3) If pressing (MENU), it backs to main screen. If pressing (ENT), it shows as follows
4) Display ROUTE NO. with five lines once. Available to see all set up information by ✥.
5) If pressing (MENU), it backs to main screen. If selecting (ENT), available to assign current route. It will be ROUTES NAVIGATION mode..

```
    - - R O U T E S  C R E A T E - -
N A M E : R U T - 0 1      N O . 0 1
    0 1  W P T - 0 0 1    +  0 0 1
    0 2
    0 3
    0 4
E x i t [ M E N U ]  L O G [ E N T ]
```

6.2 SET-UP PLOTTER

Press (MENU) at the main screen, it displays MAIN MENU
After conversing plotter's letter, press (MENU). it shows "PLOTTER SETUP" screen.

1. TRACK RECORD
1) TRACK REC mode. it can be " OFF", "DISTANCE"," TIME"
2) For changing setup, it converses current setup at the "PLOTTER SETUP" screen. Press (ENT). It displays the screen at left
3) Convert the letter by ✥, press (ENT) to setup and be back to the above display.

```
    - - R O U T E S  C R E A T E - -
N A M E : R U T - 0 1      N O . 0 1
    0 1  W P T - 0 0 1    +  0 0 1
    0 2
    0 3
    0 4
E x i t [ M E N U ]  L O G [ E N T ]
```

<PLOTTER SETUP>

2. INTERVAL(Setup route record intervals)
1) INTERVAL setup: Depends on TRACK REC, it is supposed to setup and operate same as present display.
2) Converse a interval numercial value at "PLOTTER SETUP" by direction button and press (ENT) Available to set up figures by ✥.
3) The range is selected as follows;
Distance interval : 0.1, 0.2, 0.5, 1, 3, 5nm
Time interval : 30 sec, 1, 3, 5, 10, 30 min

3. BRG REF(Setup the standard of azimuth)
1) To display the azimuth between present position and waypoint, the standard is TRUE NORTH or Magnetic North. Display the present unit.
2) Press (ENT) on selected letter, it will change to "MAG" or "TRUE".

4. MAG VAR(Setup error of magnetic north)
1) Errors of true North and Magnetic north depend on each position.
2) Selecting AUTO(with (ENT)) : It sets up automatically. (Not able to be changed)
Selecting MANUAL(with (ENT)): User can set up
3) In order to revise the value, press direction keys to invert the number.
After pressing (ENT), make the value blink by ◀ and ▶.

5. WYPT MARK(WAYPOINT MARK setup)

1) It can set up whether it displays all WAYPOINT MARK or just destination and DSP GOGO(it displays next destination) or DSP ALL(it displays all destination)

2) After pressing the direction key to invert the letter displayed(DSP GOTO or DSP ALL), press [ENT]

"DSP GOTO"---->"DSP ALL" or

"DSP ALL"---->"DSP GOTO"

6. RESET TRIP(Resetting the distance from the correct route)

1) It can reset to the beginning of distance from the route.

After inverting the letter "RESET TRIP" by direction key, press [ENT] "Reset trip?", YES NO" will be shown.

After "YES" is inverted by [ENT] button, contents of TRIP will be erased adn back to PLOTTER SETUP.

After "NO" is inverted by [ENT] button , it cancels and back to PLOTTER SETUP.

## 6.3 ALARMS SET-UP

On the MAIN DISPLAY.

[MENU] : MAIN MENU ----> Invert "ALARM" by ✥ --->[ENT]

ALARM SETUP will be displayed as follows

In ALARM SETUP, user can change the MENU you choose.

(Invert the letter by direction key, press [ENT] )

```
 --  ALARMS  SETUP  --
 UZZER  :Short
ARRIVAL:Off     0.10nm
ANCHOR  :Off     0.10nm
XTE     :Off     0.10nm
SPEED   :Off     10.0kt
TRIP    :Off      100nm
```

## 6.4 ERASE

When you push MENU button in Main Screen, the MAIN MENU appears. After converting ERASE letter by ✥, press [ENT]., the display appears like right example. After converting letters by ✥ in ERASE MENU DISPLAY, press [ENT], it displays each menu.

```
------  ERASE  ------

WAYPOINTS/MARKS
ROUTES
TRACK
MENU  SETTINGS
ERASE  ALL
```

1) Delete WAYPOINTS/MARKS

After converting WAYPOINT/MARKS by ✥ button, press the button [ENT],

"ALL WPT.MARK ? and "YES NO" will be indicated.

* After converting "Yes", press the button [ENT]. it deletes WAYPOINTS/MARKS

* After converting "NO", press the button [ENT], it shows WAYPOINTS/MARKS.

After converting deleting number by ✥ key and press [ENT].

It deletes data of WAYPOINTS/MARKS.

2) Delete ROUTES

After converting "ROUTE" letter by ✥. Press [ENT], ALL ROUTE? and "YES NO" is shown.

After it converts "Yes", press [ENT]. It deletes WAYPOINTs and MARKS data stored to memory.

3) Delete TRACK

After choosing "TRACK" letters by ✥, press [ENT], Are you sure? and it indicates "YES NO".

* After selecting "YES", press [ENT], it deletes TRACK data.

* After selecting "NO", press [ENT], it doesn't delete

4) The first stage of MENU SETTING

After selecting "MENU SETTING" letters by ✣, press [ENT]

ARE YOU SURE? and "Yes No" is shown.

* After selecting "YES", press [ENT], the setting value sets to the beginning value.
* After selecting "No", press [ENT], it cancels "MENU SETTING"

5) DELETE MEMORY

After selecting “ERASE ALL” by ✣, press [ENT] ,"Are you sure ?" and “Yes No" is shown.

After selecting "YES", press [ENT], it deletes all saved data

After selecting "NO", press [ENT] , it is not canceled. It deletes all saved DATA from MEMORY.

6.5 DGPS

When it uses Beacon Receiver for DGPS, it sets and press [MENU], it shows MAIN MENU, after it selects DGPS by ✣, press [ENT] and it shows DGPS setting display.

```
 --  DGPS SETTING  --

MODE        : AUTO
FREQUENCY : 280.0  KHz
SPEED       : 100    bps
```

<DGPS setting display>

1) Select receiving mode

The receiving mode sets the operation of the Beacon Receiver automatically and manually.

But it sets frequency and speed of data in case of speciality.

* After it selects "DGPS" by ✣, press [ENT], "AUTO" or MANU is changed

2) Select frequency

It sets receiving frequency of Beacon Receiver and it selects setting frequency form automatic mode.

* After it selects "FREQUENCY" by ✣, press [ENT], it selects setting frequency and shows it
* After it flickers changeable figures by ✣, it selects changeable figures by ✣, press [ENT] and input

3) Select frequency

It sets data speed of Beacon Receiver and it selects it regardless of setting speed from automatic mode.

* After selecting "SPEED" by ✣, press [ENT], a figure of frequency is shown.
* After it flickers position of changeable figure by ✣, it selects changeable figure by ✣, press [ENT] and input.

6.6 CALCULATE

It has the function that the indication of calculation from WAYPOINT to WAYPOINT or from WAYPOINT of ROUTES to WAYPOINT TTG,ETA,RNG,BRG or position of ship.

1. Calculate WAYPOINTS

1) MODE :

Selects "MODE" by ✥ and press [ENT]. "WAYPOINTS" or "ROUTE" is shown.

Selects WAYPOINTS by ✥.

```
      --CALCULATION--
MODE:ROUTE          (R=01)
FROM:01             (W=001)
TO  :02             (W=002)
SPD :AUTO       12.6kt
TTG:            ETA:
RNG:000.0nm  BRG:002'
```

<WAYPOINTS calculation>

2) FROM : It sets starting position, after it selects "FROM" by ✥, press [ENT],
Select "SHIP" or "WAYPOINTS" by ✥.

3) TO : Ending position. After it selects "TO" by ✥, press [ENT], it shows "WAYPOINTS LIST".
Select "WAYPOINTS" by ✥.

4) SPD : Speed of ship in order to calculate TTG and ETA from starting point to ending point.
It sets and it is available to input AUTO or MANU

After it selects "SPD" by ✥, press [ENT], it changes to AUTO, it inputs speed automatically. But it sets AUTO, press [ENT], the current speed is selected.

After it flickers the position of figure by ✥, it selects changeable figure by ✥, press [ENT].

* It sets to the latest average speed under AUTO. latest average speed " means averaged speed from AVR SPEED on GPS SETUP MENU.

5) If it inputs the MODE, FROM, TO, SPD, TTG, ETA, RNG, BRG is shown on GPS calculation.

2. Calculate time, distance, direction WAYPOINT which registered in ROUTE.

1) FROM : it sets ending position,

After it selects "FROM" by ✥, press [ENT], ROUTES SELECTS is shown.

```
  --  ROUTES SELECT  --
NAME:RUT-01      No.01
   01  WPT-001    +  001
   02
   03
   04
Exit[MENU]  SET[ENT]
```

<ROUTES SELECT >

2) TO : It sets ending position.

After it sets "TO" by ✥, press [ENT] , ROUTES SELECT is shown.

After it selects WAYPOINTS that registered in ROUTE,push [ENT].

3) SPD : It need speed of ship in order to calculate TTG and ETA from starting point to ending point. It sets and it is available to input AUTO or MANU

After it selects "SPD" by ✥, press [ENT], it changes to AUTO, it inputs speed automatically. But it sets

AUTO, press [ENT], the current speed is selected.

After it flickers the position of figure by ✥, it selects changeable figure by ✥, press [ENT].

* It sets to the latest average speed under AUTO. latest average speed " means averaged speed from AVR SPEED on GPS SETUP MENU.

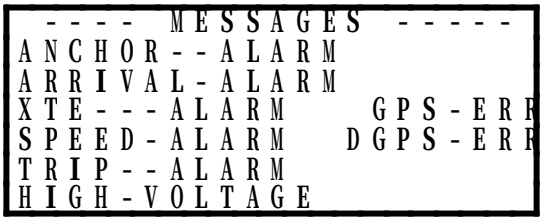
4) If it inputs the MODE, FROM, TO, SPD ,TTG, ETA, RNG, BRG is shown on GPS calculation

6.7 MESSAGES

It checks to work situation and outside input voltage and signal of this equipment and then the result is shown

1. When you push MENU switch in Main screen.
The MAIN MENU appears.
After it selects MESSAGE letter by ✥, press [ENT].
The display appears like a right's picture.

.




<MESSAGES>

2. HIGH VOLTAGE and LOW VOLTAGE, GPS ERR and will be indicated in the same place of the indicator.

3. Massage regarding Fatal problem will be shown by alarm.

<Message Contents & Solution >

ANCHOR ALARM : SET UP ANCHOR ALARM AGAIN. --> CHECK

ARRIVAL ALARM : SET UP ARRIVAL ALARM --> CHECK

XTE ALARM : SET UP XTE ALARM --> CHECK

SPEED ALARM : SET UP SPEED ALARM --> CHECK

TRIP ALARM : SET UP TRIP ALARM --> CHECK

DGPS ERR : CHECK the input cable and signal --> CHECK & REPAIR

EXP ERR : CHECK outside input DATA cable and signal --> CHECK & REPAIR

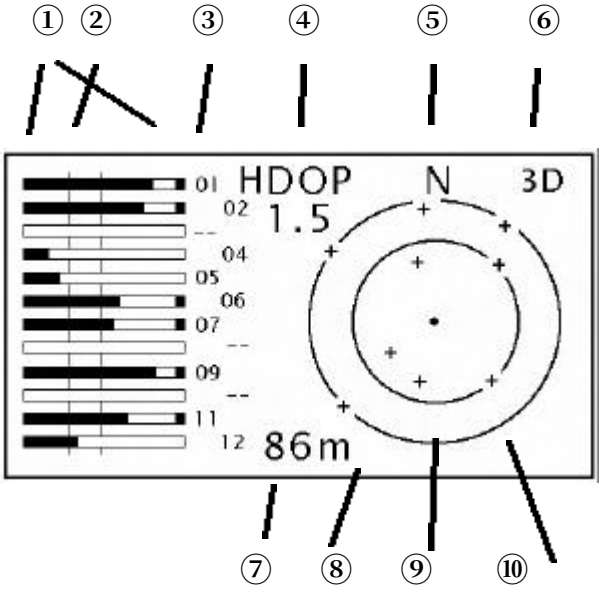
HIGH VOLTAGE : input voltage is so high (supply regularity voltage.) -> REPAIR immediately

LOW VOLTAGE : input voltage is so less (supply regularity voltage.) -> REPAIR immediately

6.8 SATELLITE

Indicate receiving situation of the current GPS with helping graph and picture.

1. After selecting SATELLITE FUNCTION in Main Menu, Press the button.
   The following pictures will be shown.




2. The Contents will be as follows.

① It is recorded receiving sensitivity from total 12 Satellite. It records with length of the line according to sensitivity's strength from left side to right side.

For example receiving sensitivity (No.7) - It is 55 if the maximum sensitivity 100.

* If you use satellite as a direction. It displays at the right of the graph.

② The left line from the antenna is displayed as a level of the minimum receiving signal and the right line is displayed as a line receiving sensitivity position.

It does not use as a satellite for the direction in the event of the less than the right line.

③ It displays satellite number in the display (maximum 12)

④ HDD is displayed.

⑤ It displays the north direction for the satellite.

⑥ It displays presently GPS receiving situation.

⑦ It displays presently an altitude.

⑧ It displays 5 degree as a line for the degree of the satellite.

⑨ It displays 45 degree as a line for the degree of the satellite.

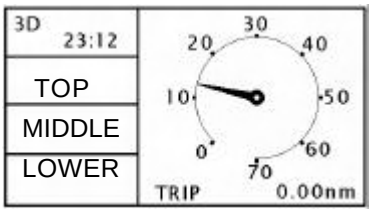
⑩ It displays "+" as a position of the satellite.

6.9 USER DISPLAY

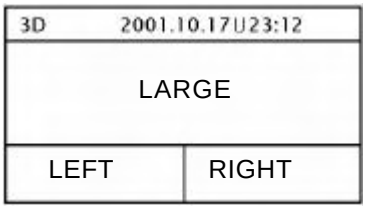
USER DISPLAY consists of digital indicator screen and Speedometer.
The contents and manual is the same as the Sector 5.

1. How to set up

1) Basically construction consists of Speedometer and Digital indicator screen as following picture. Every display has LARGE/TOP. LEFT/MIDDLE. RIGHT/LOWER




<Speedometer>




<Digital>

2) After choosing USER DISP in Main Menu. Press the button ENT. It displays at left picture.
3) It is possible to choose Speedometer and Digital indicator screen in USER DISP.
4) After it selects "LARGE/TOP" by direction switch, press the button ENT.
5) It is the same as 4), if you set up LEFT or MIDDLE and RIGHT or LOWER.

2. Item by user's set up

The item by users are 3 item by users are 3 item among of the SOG, COG, RNG, TTG, ETA, TRIP, PWR.

<USER DISPLAY SETUP>

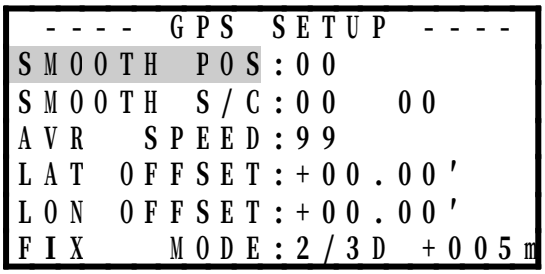
6.10 GPS SETUP

It sets up GPS receiving in GPS set-up item.

It displays as a following picture, after choosing GPS-SETUP in Main Menu pressing ✥.

1. HOW TO SET UP

After selecting letters which is willing to select, press [ENT] and then the one letter flickers.
Available to input and change the letters by direction switch.




<GPS SETUP >

2. HOW TO SET UP SMOOTH POS.

It is displayed average value in through GPS of the mother ship position.
It is reduced accidental error. Set up time is 0(Smoothing off) - 99.

3. SMOOTH S/C(Smoothing speed/course)

Displayed average value in through GPS of the mother ship position. It is reduced accidental speed and course. The left figure is speed and The right figure is the Course. Set up time is 0(Smoothing off) - 99.

4. AVR SPEED(Speed averaging)

It has a function for calculating. It has to input speed in forecasting time. And then It is averaged speed when the speed set up to the AUTO. Set up time is 0(Smoothing off) - 99.

5. LAT/LON OFFSET(Latitude/Longitude position offset)

It can make correct ±00.00 - 99.99 for correcting latitude and Longitude.

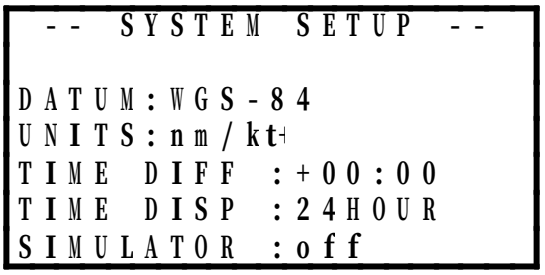
6. FIX MODE

It sets height of antenna when it is GPS receiving mode and 2D.

1) At GPS receiving mode, it selects "FIX MODE" by ✥, press [ENT], 2D or 2/3D is selected and input. After it selects 2D or 2/3D by ✥.
2) When the height setting of antenna is 2D, press [ENT] when 2D or 2/3 D is selected.
The height of antenna is selected.

6.11 SYS SET-UP

Select SYS SETUP on MAIN MENU and press (ENT).




1. HOW TO SETUP

Make the letter of item which is willing to set by ✣ and press (ENT).

2. DST-C CALC SETUP

1) DST-C CALC : Great Circle

* Great Circle Navigation - A segment of such a circle representing the shortest distance between two terrestrial points

2) DST-C CALC : Rhumb Line

* Rhumb Line Navigation -The path of a ship that maintains a fixed compass direction, shown on a map as a line crossing all meridians at the same angle.

3. DATUM

1) Set a standard coordinates which is made sea chart. The valid datum over the world is WGS-84.

2) The standard coordinates which is selectable are 171 in total and the coordinates which is using frequently are WGS-84, WGS-72, KOREA/TOKYO, NORTH AMERI1927, EUROPEAN 1950, AUSTRALIAN 1984 and ADIADAN. Select ECT.SET and press (ENT) to set standard coordinate number from 001 to 171.

3) How to set ECT. SET

With 2) in above, press (ENT) at the status of "ECT. SET". Show converted Datum number.

Refer to the table of "International Geodetic Datum" for data change.

Use (✣) to change a numerical date for new datum and press (ENT).

4. UNIT

It selects the display Unit and it displays display unit set in this clause of all display screen. The selectable unit is of distance unit and speed unit, one can be selected among unit of nm/kt, km/kh and mm/mh.

* After selection with top and bottom direction switch, and press (ENT).

5. TIME DIFF.

Time difference between world standard time and present ship's is input and it can be input from −13:30 ∼ +13:30.

* The position of the letter (number) to be changed has to be flickering with right and left direction switch and selection of number (letter) to be made with top and bottom switch, then press the switch, it would be input.

6. TIME DISPLAY

Time display methods when showing time at all screens, it can select either 24 hour display method or 12 hour display method. In 12 hour display method, it displays "01:25P" (A stands for a.m while P stands for p.m). In 24 hour display method. It displays "13:25".

"U13:25" stands for UTC time and "L13:25" stands for Local time.

* After selection made by top and bottom switch, press ✣ then it is input.

7. SIMULATOR

It is used for learning how to operate. When this item is selected. GPS receiver is not used for position information and it can be operated SIMULATOR information inside machine. When operator wants to stop the activation, he should turn off the power and again either turn on the power or set up "off" in the

setting menu. When SIMULATOR is working, left top side in LCD display shows "SIM" and flickering so that it tells from normal working. This letter can be displayed in every screen mode. (except Menu screen).

1) Under the condition that letter of "SIMULATOR" is opposite by ✥, press [ENT] and select the one among "off", "low", "mid", "high" by ✥ and press [ENT].

* Off in setting value is normal operation condition without using SIMULATOR and it is always set "off" when the power is off. Low, mid, high is SIMULATOR speed.

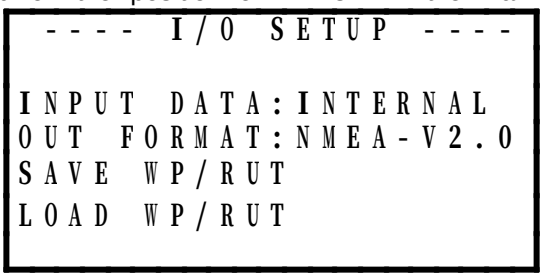
## 6.12 I/O SETUP

In the item of I/O SET-UP, INPUT and OUTPUT related item can be set up and data of waypoints and route can be put through PC.

After selection of I/O SETUP in main MENU screen, press [ENT] and the following screen is displayed.

### 1. INPUT DATA

This is for setting up whether GPS DATA can be used by either GPS. Receiver or other external system, when it is setup with external system. "EXTERNAL" is displayed on the position of DATUM in the Main Screen.




1) Way of setup

After letting "INPUT DATA". to be opposite by direction switch. press [ENT], then the present set contents will be displayed in opposite. After selection either "EXTERNAL" or "INTERNAL" by ✥, press [ENT], then set up is completed.

### 2. FORMAT

It sets up output methods when GPS data is put through EXTERNAL SYSTEM.

1) FORMAT SETUP

After "OUT FORMAT" is reversed by shift key. If press [ENT], setup's contents is reversed. After selecting changable table by ✥, if press [ENT] selected table do setup.

2) Setting modes are NMEA-V1.5, NMEA-V2.0, FURUNO CIF. Among them, can select one.

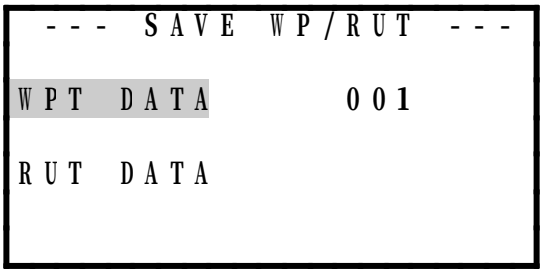
### 3. SAVE WP/RUT

If press [ENT] this items, show as left-picture.

1) After WPT DATA is reversed by ✥, if press [ENT], stored WAYPOINTS DATA outputs to outside device(PC). When output, output WAYPOINTS number shows left-display.

* When output, if pressing [MENU] immediately stop, return to WAYPOINTS, ROUTE.

* When output, if pressing [MENU]. immediately stop, return to WAYPOINTS, ROUTE.




<WAYPOINTS, ROUTE>

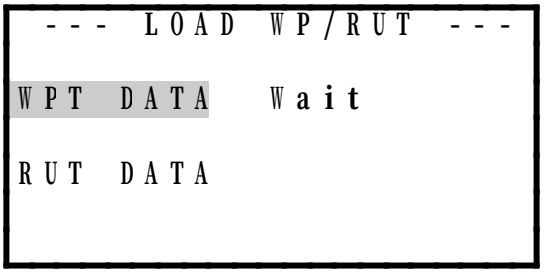
2) ROUTE output

After RUT DATA is reversed by ✥, if press [ENT], stored ROUTE DATA outputs to outside device(PC). When output, output ROUTE Number shows to right-display

When output, if pressing [MENU], immediately stop return to WAYPOINTS/ROUTES.

4. LOAD WP/RUT

LOAD WP/RUT : If press [ENT] show as right-picture.




1) WAYPOINTS input

After WPT DATA is reversed by ✥, if press [ENT], WAYPOINT DATA inputs to inside momory from PC. When input, WAYPOINTS number shows right-display, when standby, show "WAIT".

When input or standby, if press [MENU], immediately stop. Return to WAYOINTS, ROUTE.

2) ROUTE input

After RUT DATA is reversed by ✥, if press [ENT], WAYPOINT DATA puts to inside memory from PC. When input, ROUTE number shows right-display. When standby, "WAIT".

* When input or standby, if press [MENU], immediately stop. Return to WAYPOINTS, ROUTE.

5. FORMAT

1) INPUT DATA FORMAT(EXTERNAL)

When input GPS DATA from outside, input as follows

(According to Ver1.5 and Ver2.0 of NMEA-0183)

*. NMEA-V1.5

$GPGGA,005630,3505.251,N,12902.339,E,1,3,001,,M,,M<cr><lf>

$GPGLL,3505.25,N,12902.34,E<cr><lf>

$GPVTG,258,T,264,M,00.7,N,01.4,K<cr><lf>

$GPZDA,005630,30,05,1933,+09<cr><lf>

$GPODA,P,025.1<cr><lf>

*. NMEA-V2.0

$GPGGA,063258.00,3505.1701,N,12904.2314,E,1,05,02.5,,M,,M,,*6A<cr><lf>

$GPGLL,3505.1701,N,12904.2314,E,063258.00,A*00<cr><lf>

$GPRMC,063258.00,A,3505.1701,N,12904.2314,E,00.2,134.8,281201,,*03<cr><lf>

$GPVTG,134.8,T,141.7,M,00.2,N,00.3,K*42<cr><lf>

$GPZDA,063258,28,12,2001,+09,00*6C<cr><lf>

2) OUT FORMAT

*. NMEA-V1.5

$GPGGA,063137,3505.169,N,12904.227,E,1,05,02.1,,M,,M<cr><lf>

$GPGLL,3505.169,N,12904.227,E<cr><lf>

$GPRMC,063137,A,3505.169,N,12904.227,E,00.3,070.3,281201,,<cr><lf>

$GPVTG,070.3,T,077.2,M,00.3,N,00.5,K<cr><lf>

$GPZDA,063137,28,12,2001,+09<cr><lf>

*. NMEA-V2.0

$GPGGA,063258.00,3505.1701,N,12904.2314,E,1,05,02.5,,M,,M,,*6A<cr><lf>

$GPGLL,3505.1701,N,12904.2314,E,063258.00,A*00<cr><lf>
$GPRMC,063258.00,A,3505.1701,N,12904.2314,E,00.2,134.8,281201,,*03<cr><lf>
$GPVTG,134.8,T,141.7,M,00.2,N,00.3,K*42<cr><lf>
$GPZDA,063258,28,12,2001,+09,00*6C<cr><lf>

*. FURUNO CIF
FURUNO-CIF+00=<STX><11019930219133530G+0900>
FURUNO-CIF+24=<FS><240N350525E12902340000>
FURUNO-CIF+47=<FS><44+0993590><ETX>

3) WP/RUT DATA (PC) (Uploading Downloading)

* WAYPOINTS DATA

$SAWPT,001,WPT-001 ,00,3504.975,N,12904.397,E*02<cr><lf>
--- -------- -- ---------- ---------- --
a b c d e f

↳a -> WAYPOINTS MARK (000~999까지)
↳b -> WAYPOINTS MARK
↳c -> MARK (00~99 )
↳d -> latitude 00 00 000 N/S
↳e -> longitude 00 00 000 E/W
↳f -> Error Check 2 Code
↳<cr><lf> -> ESC and CLOSE

* ROUTE DATA

$SARUT,01, ,09,001*78<cr><lf>
--- ------- -- --- ---
a b c d e

↳a -> ROUTES (00~99 )
↳b -> ROUTES (8 )
↳c -> WAYPOINTS (00~99 )
↳d -> WAYPOINTS (000~999 )
↳e -> Error Check 2 Code
↳<cr><lf> -> ESC and CLOSE

7. ANCHORAGE

1) Select ANCHORAGE and then show following screen up.
2) Move a cursor by using ◀ ▶ and input data by using ▲ ▼, press (ENT).
The input data is appointed as a vessel position.
3) Press (MENU) for the return to main screen.

8. NAVIGATION RELEASE

1) Select NAVIGATION and then show the following screen up.
Press (ENT) on "YES", all navigation is released.

# CHAPTER 7. BLOCK DIAGRAM

# CHAPTER 8. ATTACHMENT

1. Geodetic Datum

| International Geodetic Datum | 1/4 |
|---|---|
| 001 WGS-84 | |
| 002 WGS-72 | |
| 003 TOKYO | Mean Value (Japan, Korea & Okinawa) |
| 004 NORTH AMERICAN 1927 | Mean value (CONUS) |
| 005 EUROPEAN 1950 | Mean value |
| 006 AUSTRALIAN GEODETIC 1984 | Australia and Tasmania Island |
| 007 ADIADAN | Mean Value |
| 008 | Ethiopia |
| 009 | Mali |
| 010 | Senegal |
| 011 | Sudan |
| 012 AGF | Somalia |
| 013 AIN EL ABD 1970 | Bahrain Island |
| 014 ANNA 1 ASTRO 1955 | Cocos Island |
| 015 ARC 1950 | Mean Value |
| 016 | Botswana |
| 017 | Lesotho |
| 018 | Malawi |
| 019 | Swaziland |
| 020 | Zaire |
| 021 | Zambia |
| 022 | Zimbabwe |
| 023 ARC | Mean Value (Kenya & Tanzania) |
| 024 | Kenya |
| 025 | Tanzania |
| 026 ASCENSION ISLAND 1958 | Ascension Island |
| 027 ASTRO BECON "E" | Iwo Jima Island |
| 028 ASTRO B4 SOR. ATOLL | Tern Island |
| 029 ASTRO POS 714 | St. Helena Island |
| 030 ASTRONOMIC STATION 1952 | Marcus Island |
| 031 AUSTRALIAN GEODETIC 1966 | Australia and Tasmania Island |
| 032 BELLEVUE(IGN) | Efate and Erromango Islands |
| 033 BERMUDA 1957 | Bermuda Islands |
| 034 BOGOTA OBSERVATORY | Columbia |
| 035 CAMPO INCHAUPE | Argentana |
| 036 CANTON ISLAND 1966 | Phoenix Island |
| 037 CAPE | South Africa |
| 038 CAPE CANAVERAL | Mean Value (Florida & Bahama Islands) |
| 039 CARTHAGE | Tunisia |
| 040 CHATHAM 1971 | Chatham Island (New Zealand) |

| International Geodetic Datum | 2/4 |
|---|---|
| 041 CHUA ASTRO | Paraguay |
| 042 CORREGO ALEGRE | Brazil |
| 043 DJAKARTA (BARAVIA) | Sumatra Island (Indonesia) |
| 044 DOS 1968 | Gizo Island (New Georgia Island) |
| 045 EASTER ISLAND 1967 | Easter Island |
| 046 EUROPEAN 1950 (Cont'd) | Western Europe |
| 047 | Cyprus |
| 048 | Egypt |
| 049 | England, Scotland, Channel & Shetland Islands |
| 050 | England, Scotland, Channel & Shetland Islands |
| 051 | Greece |
| 052 | Iran |
| 053 | Italy-Sardinia |
| 054 | Italy-Sicily |
| 055 | Norway and Finland |
| 056 | Portugal and Spain |
| 057 EUROPEAN 1979 | Mean Value |
| 058 GANDAJIKA BASE | Republic of Maldives |
| 059 GEODETIC DATUM 1949 | New Zealand |
| 060 GUAM 1963 | Guam Island |
| 061 GUX 1 ASTRO | Guadalcanal Island |
| 062 HJORSEY 1955 | Iceland |
| 063 HONG KONG 1963 | Hong Kong |
| 064 INDIAN | Thailand and Vietnam |
| 065 | Bangladesh, India and Nepal |
| 066 IRELAND | Ireland |
| 067 ISTS 073 ASTRO 1969 | Diego Garcia |
| 068 JHONSTON ISLAND 1961 | Jhonston Island |
| 069 KANDAWALA | Sri Lanka |
| 070 KERGUELEN ISLAND | Kerguelen Island |
| 071 KERTAU 1948 | West Malaysia and Singapore |
| 072 LA REUNION | Mascarene Island |
| 073 L.C. 5 ASTRO | Cayman Brac Island |
| 074 LIBERIA 1964 | Liberia |
| 075 LUZON | Philippines (Excluding Mindanao Island) |
| 076 | Mindanao Island |
| 077 MAHE 1971 | Mahe Island |
| 078 MARCO ASTRO | Salvage Islands |
| 079 MASSAWA | Eritrea (Ethiopia) |
| 080 MERCHICH | Morocco |
| 081 MIDWAY ASTRO 1961 | Midway Island |
| 082 MINNA | Nigeria |
| 083 NAHRWAN | Masirah Island (Oman) |
| 084 | United Arab Emirates |
| 085 | Saudi Arabia |
| 086 NAMIBIA | Namibia |
| 087 MAPARIMA,BWI | Trinidad and Tobago |
| 088 NORTH AMERICAN 1927 | Western United States |
| 089 | Eastern United States |
| 090 | Alaska |

| International Geodetic Datum | 3/4 |
|---|---|
| 091 | Bahamas (Excluding San Salvador Island) |
| 092 | Bahamas-San Salvador Island |
| 093 NORTH AMERICAN 1927 | Canada (Including Newfoundland Island) |
| 094 | Alberta and British Columbia |
| 095 | East Canada |
| 096 | Manitoba and Ontario |
| 097 | Northwest Territories and Saskatchewan |
| 098 | Yukon |
| 099 NORTH AMERICAN 1927 | Canal Zone |
| 100 | Caribbean |
| 101 | Central America |
| 102 | Cuba |
| 103 | Greenland |
| 104 | Mexico |
| 105 NORTH AMERICAN 1983 | Alaska |
| 106 | Canada |
| 107 | CONUS |
| 108 | Mexico, Central America |
| 109 OBSERVATORIO 1966 | Corvo and Flores Islands (Azores) |
| 110 OLD EGYPTIAN 1930 | Egypt |
| 111 OLD HAWAIIAN | Mean Value |
| 112 | Hawaii |
| 113 | Kauai |
| 114 | Maui |
| 115 | Oahu |
| 116 OMAN | Oman |
| 117 Ordnance Survey of Great Britain 1936 | Mean Value |
| 118 | England |
| 119 | England, Isles of Man and Wales |
| 120 | Scotland and Shetland Islands |
| 121 | Wales |
| 122 PICO DE LAS NIVIES | Canary Islands |
| 123 PITACAIRN ASTRO 1967 | Pitacaim Island |
| 124 Provisional South Chilean 1963 | South Chile (near 53'S) |
| 125 Provisional South American 1956 | Mean Value |
| 126 | Bolivia |
| 127 | Chile-Northern Chile (near 19'S) |
| 128 | Chile-Southern Chile (near 19'S) |
| 129 | Colombia |
| 130 | Ecuador |
| 131 | Guyana |
| 132 | Peru |
| 133 | Venezuela |
| 134 PUERTO RICO | Puerto Rico and Virgin Islands |
| 135 QATAR NATIONAL | Qatar |
| 136 QORNOQ | South Greenland |
| 137 ROME 1940 | Sardinia Islands |
| 138 SANTA BRAZ | Sao Maguel, Santa Maria Islands (Azoes) |
| 139 SANTO (DOS) | Espirito Santo Island |
| 140 SAPPER HILL 1943 | East Falkland Island |

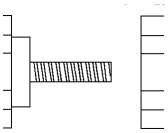
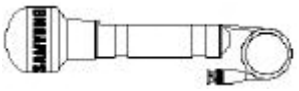
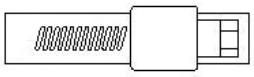
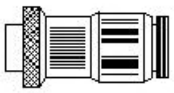
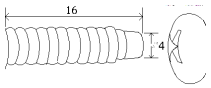
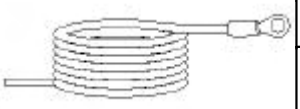
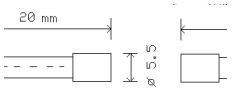
| International Geodetic Datum | 4/4 |
|---|---|
| 141 SOUTH AMERICAN 1969 | Mean Value |
| 142 | Argentina |
| 143 | Bolivia |
| 144 | Brazil |
| 145 | Chile |
| 146 | Columbia |
| 147 | Ecuador |
| 148 | Guyana |
| 149 | Paraguay |
| 150 | Peru |
| 151 | Trinidad and Tobago |
| 152 | Venezuela |
| 153 SOUTH ASIA | Singapore |
| 154 SOUTHEAST BASE | Porto Santo and Madeira Islands |
| 155 SOUTHWEST BASE | Faial, Graciosa, Pico, Sao Jorge and Terceira Island |
| 156 TIMBALAI 1948 | Brunei and East Malaysia (Sarawak & Sadah) |
| 157 TOKYO | Japan |
| 158 | Korea |
| 159 | Okinawa |
| 160 TRISTAN ASTRO 1968 | Tristan da Cunha |
| 161 VITI LEVU 1916 | Viti Levu Island (Fiji Islands) |
| 162 WAKE-ENISETOK 1960 | Marshall Islands |
| 163 ZANDERIJ | Suriname |
| 164 BUKIT RIMPAH | Bangka and Belitung Islands (Indonesia) |
| 165 CAMP AREA ASTRO | Camp Memurdo Area, Antarctica |
| 166 G.SEGARA | Kalimantan Islands (Indonesia) |
| 167 HEART NORTH | Afghanistan |
| 168 HU-TZU-SHAN | Taiwan |
| 169 Tananarive Observatory 1925 | Madagascar |
| 170 YUCARE | Urguay |
| 171 RT90 | Sweden |

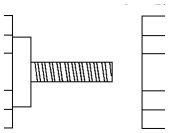
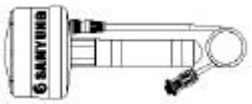
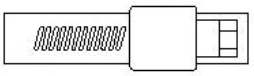
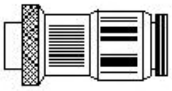
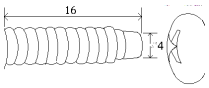
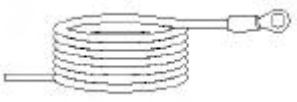
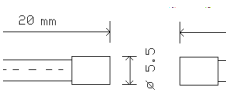
2. Geodetic Datum

| International Geodetic Datum |
|---|

| | |
|---|---|
| 00 | WGS-84 |
| 01 | WGS-72 |
| 02 | TOKYO |
| 03 | NAD-27 |
| 04 | ALASKA/CANADA |
| 05 | EUROPEAN 50 |
| 06 | AUSTRALIAN 84 |
| 07 | SOUTH ASIA |
| 08 | SOUTH AMERICA |
| 09 | GREENLAND |
| 10 | NAD-83 |
| 11 | ICELAND 55 |
| 12 | ICELAND 65 |
| 13 | NEW ZEALAND |
| 14 | EUROPEAN 79 |
| 15 | ROME 40 |
| 16 | SOUTH AFRICA |
| 17 | SAUDI ARABIA |
| 18 | INDIAN/NEPAL |
| 19 | PHILLIPPINES |
| 20 | ENGLAND |
| 21 | HAWAII |
| 22 | DJAKARTA |
| 23 | MALAYSIA |
| 24 | JAPAN |
| 25 | ETHIOPIA |
| 26 | SOMALIA |
| 27 | BAHRAIN |
| 28 | COCOS |
| 29 | ARC 50 |
| 30 | ARC 60 |
| 31 | ASCENSION |
| 31 | MOROCCO |
| 32 | IWO JIMA |
| 33 | TERN |
| 34 | ST.HELENA |
| 35 | MARCUS |
| 36 | EFATE |
| 37 | BERMUDA |
| 38 | COLOMBIA |
| 39 | ARGENTINA |
| 40 | PHOENIX |
| 41 | FLORIDA |

| | |
|---|---|
| 42 | TUNISIA |
| 43 | CHATHAM |
| 44 | PARAGUAY |
| 45 | BRAZIL |
| 46 | NEW GEORGIA |
| 47 | EASTER |
| 48 | MALDIVE |
| 49 | GUAM 63 |
| 50 | GUADAL CANAL |
| 51 | HONG KONG 63 |
| 52 | DIEGO GARCIA |
| 53 | JOHNSTON |
| 54 | SRI LANKA |
| 55 | KELGUELEN |
| 56 | CAYMAN BRAC |
| 57 | LIBERIA 64 |
| 58 | MAHA 71 |
| 59 | SALVAGE |
| 60 | ERITREA |
| 62 | MIDWAY 61 |
| 63 | NIGERIA |
| 64 | TRINIDAD |
| 65 | CORVO/FLORES |
| 66 | EGYPT |
| 67 | OMAN |
| 68 | CANARY |
| 69 | PITCAIRN |
| 70 | SOUTH CHILE |
| 71 | PUERTO RICO |
| 72 | QATAR |
| 73 | MASCARENE |
| 74 | SANTO |
| 75 | SANTA MARIA |
| 76 | EAST FALKLAND |
| 77 | PORTO SANTO |
| 78 | FAIAL |
| 79 | EAST MALAYSIA |
| 80 | TRISTAN |
| 81 | FIJI |
| 82 | MARSHALL |
| 83 | SURINAM |
| 84 | FINLAND |
| 85 | SWEDEN |

| GPS SPR-1400 (1/1) | | | | | | | |
|---|---|---|---|---|---|---|---|
| NO. | ITEM | DESCRIPTION | DIMENSION | | Q'TY | CHECK | REMARK |
| 1 | Main Unit | | SPR-1400 | | 1 | | |
| | | | CODE NO. | SPR-1400 | | | |
| 2 | Bracket | | | | 1 | | |
| | | | CODE NO. | SPR-1401 | | | |
| 3 | Bolt |  | Ø6mm × 14 | | 2 | | |
| | | | CODE NO. | SPR-1402 | | | |
| 4 | Antenna |  | SAN-60 | | 1 | | RG58C/U |
| | | | CODE NO. | SPR-1403 | | | |
| 5 | Band |  | Ø65 | | 2 | | |
| | | | CODE NO. | SPR-1404 | | | |
| 6 | DC Power Cable | | VCTF1.25SQ × 2C | | 1 | | SCN-16-2P |
| | | | CODE NO. | SPR-1405 | | | |
| 7 | Date Cable |  | SCN-16-4P | | 1 | | |
| | | | CODE NO. | SPR-1406 | | | |
| 8 | Screw |   | Ø4 × 16 | | 5 | | |
| | | | CODE NO. | SPR-1407 | | | |
| 9 | Ground Cable |  | KIV 5.5㎟ | | 1 | | |
| | | | CODE NO. | SPR-1408 | | | |
| 10 | Fuse for Main Unit |   | 1A | | 2 | | |
| | | | CODE NO. | SPR-1409 | | | |
| 11 | Instruction Manual | | | | 1 | | |
| | | | CODE NO. | SPR-1410 | | | |

| DGPS DSPR-1400 (1/1) | | | | | | | |
|---|---|---|---|---|---|---|---|
| NO. | ITEM | DESCRIPTION | DIMENSION | | Q'TY | CHECK | REMARK |
| 1 | Main Unit | | SPR-1400 | | 1 | | |
| | | | CODE NO. | SPR-1411 | | | |
| 2 | Bracket | | | | 1 | | |
| | | | CODE NO. | SPR-1401 | | | |
| 3 | Bolt |  | Ø6mm × 1446 | | 2 | | |
| | | | CODE NO. | SPR-1402 | | | |
| 4 | Antenna |  | SANB-300 | | 1 | | 6P SHIELD |
| | | | CODE NO. | SPR-1412 | | | |
| 5 | Band |  | Ø65 | | 2 | | |
| | | | CODE NO. | SPR-1404 | | | |
| 6 | DC Power Cable | | VCTF1.25SQ × 2C | | 1 | | SCN-16-2P |
| | | | CODE NO. | SPR-1405 | | | |
| 7 | Data Cable |  | SCN-16-4P | | 1 | | |
| | | | CODE NO. | SPR-1406 | | | |
| 8 | Screw |   | Ø4 × 16 | | 5 | | |
| | | | CODE NO. | SPR-1407 | | | |
| 9 | Ground Cable |  | KIV 5.5㎟ | | 1 | | |
| | | | CODE NO. | SPR-1408 | | | |
| 10 | Fuse for Main Unit |   | 1A | | 2 | | |
| | | | CODE NO. | SPR-1409 | | | |
| 11 | Instruction Manual | | | | 1 | | |
| | | | CODE NO. | SPR-1410 | | | |